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QA/QC Data Review - Technical Memorandum Pagel's Pit Landfill RI/FS Rockford, Illinois

November, 1986

QA/QC DATA REVIEW
TECHNICAL MEMORANDUM

INTRODUCTION

This technical memorandum presents a review of the quality of data contained in "Supplemental Investigation, Winnebago Reclamation Landfill, Rockford, Illinois", dated March 1985, prepared by Warzyn Engineering. The purpose of the review is to determine if the data in this report is of sufficient quality to be included with other data in a Remedial Investigation Report for the Pagel's Pit Landfill (also known as Winnebago Reclamation Landfill). Submittal of this memorandum satisfies Subtask 1A of the Work Plan.

The supplemental investigation was performed to better delineate the groundwater flow system and groundwater chemistry between the eastern edge of Pagel's Pit Landfill and the western edge of the ACME facility through installation of additional groundwater monitoring wells. More importantly, the intent was to further distinguish impacts of the landfill and the Acme facility. Groundwater samples were collected on two occasions from selected wells near the facilities and analyzed for volatile organic compounds (VOCs) and indicator parameters. The reader is referred to the Supplemental Investigation report for details of the project.

This QA/QC evaluation includes a review of well construction and sampling, VOC analysis by Zimpro (a Warzyn subcontractor), and Warzyn's laboratory analysis of selected indicator parameters. A recommendation is made regarding the utility of the data for use in the Remedial Investigation report.

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MONITORING WELL CONSTRUCTION AND SAMPLING

Ten additional wells were installed as part of the Supplemental Inyestigation. In order to minimize potential cross contamination of boreholes, all drilling equipment was steam cleaned prior to the starting of a new borehole. The split-spoon sampler used was cleaned in a trisodium phosphate solution followed by deionized water between each sample. Hollow stem augers were used wherever possible to avoid contamination from drilling fluids to surrounding soil and groundwater. Rock coring was performed using potable water that was not re-circulated. The drilling water was carried in a water truck from a new deep well located at Baxter and Lindenwood Roads.

Galvanized pipe was used in well construction, so a potential for zinc contamination exists. However, zinc was not a parameter of interest and the well construction method used was consistent with that of other on-site wells.

Sampling was performed with a stainless steel bailer and cable. Both were cleaned with trisodium phosphate and rinsed with deionized water between samplings. The effectiveness of this approach is best judged by results of field blanks. However, field blanks were collected for volatile analysis only. Results of these analyses are discussed below.

ANALYSIS PERFORMED BY ZIMPRO ENVIRONMENTAL AND ENERGY SYSTEMS

The purpose of this review is to evaluate quality assurance/quality control (QA/QC) associated with the analysis of samples for volatile organics collected from Pagel's Pit landfill. All available data pertaining to analysis of these samples has been obtained from Zimpro, Warzyn's subcontracted laboratory for the investigation. Procedures used by Zimpro have been compared to procedures applied by the U.S. EPA Contract Laboratory Program (CLP). Areas addressed in this review include:

- Sample holding times and sample custody
- Laboratory blanks
- Calibration (initial and continuing)
- Surrogate recoveries
- Laboratory duplicate and spike analyses, and
- Non-method compounds.

Methods Used

Zimpro analyzed samples for compounds listed in Table 1, including compounds from EPA Methods 601 and 602 and several other solvents. Samples were analyzed using a Varian 6000 gas chromatograph with a photoionization detector in series with a Hall electro-conductivity detector. This combination is considered to be the state-of-the-art technique for the analysis of volatile compounds by gas chromatography.

Holding Times and Sample Custody

EPA Method 601/602 prescribes a 14-day holding time between sample collection and analysis. No actual documentation of holding time for the samples was available, but, from dated chromatograms, only 60% of the samples were analyzed within the prescribed holding time. All samples were analyzed within 21 days. Action recommended by the CLP is to flag all positive results for the samples as estimated. Chain-of-custody forms with signatures of field

TABLE 1

LIST OF COMPOUNDS AND REPORTED DETECTION FOR ANALYSES PERFORMED BY ZIMPRO

	Detection Limit
Benzene	0.2
Bromoform	0.5
Bromomethane	1.0
Carbon Tetrachloride	0.1
Chlorobenzene	0.1
Chloroethane	1.0
2-Chloroethylvinyl Ether	2.0
Chlororform	0.1
Chlormethane	6.0
Dibromochloromethane	0.1
1,2-Dichlorobenzene	0.3
1,3-Dichlorobenzene	0.3
1,4-Dichlorobenzene	0.3
Dichlorobromomethane	0.1
1,1-Dichloroethane	0.1
1,2-Dichloroethane	0.3
1,1-Dichloroethylene	0.5
1,2-Dichloroethylene	0.3
Dichloromethane	0.2
1,2-Dichloropropane	0.5
cis-1,3-Dichloropropene	0.3
trans-1,3-Dichloropropene	1.0
Ethylbenzene	0.2
1,1,2,2-Tetrachloroethane	0.1
Tetrachloroethylene	0.1
Toluene	0.1
1,1,1-Trichloroethane	0.1
1,1,2-Trichloroethane	0.1
Trichloroethylene	0.1
Vinyl Chloride	0.2
m-Xylene	0.5
o & p Xylene (as o-Xylene)	0.5
Acetone	80.
Methylethyl ketone	10.
Tetrahydrofuran	20.
Ethylene Dibromide	1.0
Dichlorodifluoromethane	20.
Trichlorofluromethane	0.2

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sampling personnel are available. Samples were transported by vehicle from the field to Warzyn's analytical laboratory by field personnel. Samples were given unique Warzyn laboratory numbers and sent to Zimpro for analysis by overnight express.

Blanks

Laboratory blank analyses were performed for each analysis day. A field and trip blank were collected and analyzed with the sample set. All blank results reported were acceptable with compounds less than the reportable detection limit. In addition, chromatograms indicated no problem with laboratory contamination.

Calibration

Initial calibration for the gas chromatograph for the compounds of interest was not supplied by Zimpro. Apparently, this calibration data was from a much larger non-project data set which was broken into several parts (including the Pagel data set). At the time of this review, Zimpro was unable to put together the intial calibration chromatograms that were separated. Some continuing calibration data was supplied by Zimpro. From the data supplied, the detectors appeared to remain linear with respect to quantification from day to day during analysis of the samples.

No evidence of any type of standard calibration was available for the additional compounds tetrahydrofuran, methyl ethyl ketone, ethylene dibromide, xylenes, acetone, or dichlorodifluoromethane. According to Zimpro personnel, initial calibration for these compounds is also with another set of data and, at this time, is unavailable.

Surrogates/Internal Standards

Surrogate or internal standard compounds were not added to each sample as specified by EPA Method 601/602. These compounds are used to monitor the performance and effectiveness of the purge and trap concentration step. Based on duplicate analyses and continuing standard calibration samples, the purge and trap performance of the analysis appear to be acceptable.

Duplicates/Spikes

Duplicate analyses were performed on 10% of the samples. Generally, precision was excellent and most differences were less than 15%. No spiked analyses were performed for this group of samples. Spike recoveries are used to monitor the accuracy of the method. Because no spike samples were analyzed, accuracy of test results cannot be substantiated.

Based on the limited raw analytical data provided, the following conclusions are reached for analyses performed by Zimpro:

- A rigorous analysis of the data quality relative to current volatile CLP protocol is not possible based on the limited documentation provided. It is questionable whether all data needed to recreate how volatile analyses were performed is obtainable.

- The volatile results reported for leachate may not be useful. No recovery, duplicate, or surrogate data is available to assess data quality. In addition, leachate sample chromatograms had a large interference peak which was not properly addressed.

- The precision of the analyses appears to be acceptable. The accuracy of the data cannot be confirmed. Therefore, volatile data for monitoring well samples should be considered estimated.

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ANALYSIS PERFORMED BY WARZYN

Methodologies

Analysis performed by Warzyn on samples collected at the Pagel's Pit Landfill were total phenolics, chlorides, cadmium, arsenic, barium, and alkalinity. In addition, field measurements of pH and specific conductance were made. Analytical procedures were based on the following EPA methods:

• Total Phenolics	EPA 420.1
• Chloride	EPA 325.3
• Cadmium	EPA 213.2
• Arsenic	EPA 206.2
• Barium	EPA 208.2
• Alkalinity	EPA 310.1
• pH	EPA 150.1
• Specific Conductance	EPA 120.1

Chain-of-Custody procedures were followed and custody forms having the signatures of field sampling personnel through the laboratory sample custodian are on file. None of the EPA recommended holding times for the analyses were exceeded, with the exception of a limited number of repeat analyses for total phenolics and chloride.

Available QA/QC Information

Cadmium, Arsenic and Barium

Samples for metals were field filtered (0.45 micron) and analyzed in the laboratory by furnace atomic absorption spectroscopy. For each of the analyses, the instrument was initially calibrated using a five-point standard curve with deionized water as a zero. A continuing calibration standard was analyzed after every five samples to determine whether the response was within acceptable limits or whether recalibration was necessary. Results of the continuing

calibration standards were not recorded. However, periodic instrument recalibration indicates checks for maintaining calibration were used.

Laboratory duplicates and matrix spikes were analyzed at a frequency of one per ten investigative samples. Samples with concentrations exceeding instrument calibration were diluted and reanalyzed.

Total Phenolics

Analyses were performed colorimetrically after a distillation cleanup step using the chloroform extraction technique of EPA Method 420.1. The spectrophotometer was calibrated daily using a four-point standard curve and chloroform as a zero. Laboratory duplicates and matrix spikes were analyzed at a frequency of one per ten investigative samples, with the exception of one group of 20 samples for which one duplicate and one matrix spike were analyzed. Samples were diluted when necessary so that results fell within the range of calibration.

Alkalinity and Chlorides

Alkalinity and chlorides were determined titrimetrically using potentiometric and colorimetric endpoints, respectively. For alkalinity, the titrant was obtained commercially. The titrant for chloride was prepared by the performing laboratory, however, the record of standardization was not available. For both analyses, laboratory duplicates were performed at a frequency of one per ten investigative samples. For chlorides, matrix spikes were run at the same frequency and a laboratory blank was run at a frequency of one per twenty investigative samples. Results for a single laboratory check standard were recorded.

Specific Conductance and pH

For specific conductance, a check standard was used to verify calibration. The pH meter was calibrated as per EPA method instructions.

QA/QC Analysis of Data

Criteria for examining the quality of data for inorganics analysis under the U.S. EPA Contract Laboratory Program (CLP) are provided in Laboratory Data Validation: Functional Guidelines for Evaluating Inorganics Analysis, November, 1985. To make a complete evaluation based on the above guidelines requires a higher level of QA/QC than is available for the data being considered. For purposes of this review, the suggested CLP guidelines will be used for evaluation to the extent possible. The guidelines are directly applicable to metals analyses performed by Warzyn, while other analyses performed would normally fall into the Special Analytical Services category within the CLP. For the latter analyses, level of QA effort and criteria for defining data acceptability is variable with project needs.

Cadmium, Arsenic and Barium

The QC sample results available for QA evaluation are laboratory duplicates and matrix spike samples. Frequency of QC analysis was twice the minimum CLP requirement. Results for all laboratory duplicates were within acceptable limits ($\pm$ 20% RPD for samples >5 times the detection limit and $\pm$ the detection limit for samples < 5 times the detection limit). Recoveries of all matrix spikes were within acceptable limits (75% to 125% recovery). Additional analyses that would be required for complete acceptance based on CLP criteria are:

- Laboratory preparation blank at a minimum of one per 20 investigative samples.
- Calibration verification using an independent QC reference sample.
- Documented continuing calibration checks at a minimum of 1 per 10 investigative samples.
- Duplicate analyses for each sample.
- Matrix spike analyses for each sample and the use of method of standard addition where recoveries were unacceptable.
- Verification of instrument detection limits from logged calibration.

Based on available QA/QC information, there is no reason to question the quality of reported metals data for groundwater. For most arsenic and cadmium analyses, results are below reported detection limits (0.01 mg/L for both). Acceptable recoveries for matrix spikes of groundwater samples indicate a low probability of false negatives for these data. Field duplicates were below detection limits, so no information can be drawn from the data. Matrix spike data were unavailable for leachates, which should be considered a different sample matrix. Hence, results for leachate should be considered estimated.

The majority of results for barium are above reported detection limits. Acceptable matrix spike and duplicates analyses for groundwater indicate no matrix effects and acceptable precision. Lack of an independent calibration verification standard makes confirmation of accuracy impossible. However, standards used were obtained commercially and should be of acceptable accuracy. Results for field duplicates were in reasonable agreement (average RPD = 17%, n=5) indicating field sampling procedures were acceptable. As with other metal analyses for leachate, lack of matrix spike data makes results estimated.

Total Phenolics, Alkalinity, Chlorides, Specific Conductance and pH

No specific data quality objectives are required by U.S. EPA CLP for the above analyses. The appropriate QA/QC objectives are project specific and based on the intended use of data. For the Pagel's Pit Landfill investigation, analysis results were used primarily as indicators to aid in defining and tracking any contaminant plume. Results of duplicate analyses for alkalinity, total phenolics and chloride are within acceptance criteria for CLP analyses as are results for matrix spikes for total phenolics and chloride. Independent checks of calibration or titrant standardization were not performed, so accuracy cannot be confirmed. However, for intended use of data, which is primarily to compare differences among sample locations, this confirmation is probably not critical. All field duplicates for total phenolics were below detection limits, so no inferences can be drawn. Results of field duplicates for alkalinity are considered acceptable (<20% RPD). RPD's for chloride exceeded 20% in 2 of 6 cases suggesting a possible problem from field or laboratory contamination. However, absolute differences are small making relative differences large only for low concentration samples. As with prior analyses, no information on matrix effects for leachate analyses are available making leachate results estimated. Except for leachate, for intended use of data, data quality is considered acceptable.

Results of the check standard for the conductivity meter used for specific conductance determination indicate appropriate calibration was performed (within 10% of true) for intended data usage. No QA/QC data are available with which to judge field pH data.

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SUMMARY

The major objective of this review was to determine if data from the Supplemental Investigation was of sufficient quality to be included with data in the RI report.

Monitoring well installations were performed within acceptable procedures to reduce potential intraborehole contamination. The wells should be viable monitoring well locations for the RI. Similarly, monitoring well sampling procedures were carried out in a manner to reduce interwell contamination and to maintain sample integrity.

Insufficient data are available to evaluate the quality of analytical data in the Supplemental Investigation, using rigorous CLP guidelines, particularly leachate data. However, these guidelines have been used to the extent possible to note and document potential limitations of the data.

Warzyn recommends including the Supplemental Investigation data in the Remedial Investigation as long as data limitations discussed herein are noted. Future data will be assessed using CLP guidelines. It is not clear that the Supplemental Investigation and CLP data bases are of comparable quality.

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November 26, 1986
C 12660

Mr. David Favero
U.S. EPA Region 5
Hazardous Waste Enforcement (5HE-12)
230 S. Dearborn Street
Chicago, IL 60604

Dear Mr. Favero:

Attached are five copies of the QA/QC Data Review for Pagel's Pit Landfill RI/FS. This technical memorandum is submitted in accordance with our draft project schedule.

If you have any questions or comments regarding the report, please contact us.

Sincerely,

WARZYN ENGINEERING INC.

Daniel W. Hall

Daniel W. Hall, CPGS
Project Manager

DWH/jpl/BAW
[jpl-18-2]

Enclosures: As Stated

cc: Mr. Gary Marzorati, Winnebago Reclamation Service, Rockford, IL (w/encls)
Mr. John Holmstrom, Holmstrom, & Green Rockford, IL (w/encls)
Mr. Chuck Howard, Winnebago Reclamation Services, Rockford, IL (w/encls)
Mr. Ridgway Hall, Crowell & Moring, Washington, D.C. (w/encls)
Mr. Thomas Tullock, City of Rockford, Rockford, IL (w/encls)
Mr. Richard Eick, Sanitary District of Rockford, Rockford, IL (w/encls)

Warzyn Engineering Inc.
One Science Court
University Research Park
P.O. Box 5385
Madison, Wisconsin 53705
(608) 273-0440